



ISSN: 1817-6798 (Print)

Journal of Tikrit University for Humanities

available online at: <http://www.jtuh.tu.edu.iq>
JTUH
 مجلة جامعة تكريت للعلوم الانسانية
 Journal of Tikrit University for Humanities

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Education for Humanities* Corresponding author: E-mail :
wasamshaher@tu.edu.iq**Keywords:**Optimality Theory
adaptation
Diphthongization
constraints**ARTICLE INFO****Article history:**Received 4 July, 2021
Accepted 17 Aug 2021
Available online 21 Apr 2022
E-mailjournal.of.tikrit.university.of.humanities@tu.edu.iq
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Journal of Tikrit University for Humanities

Review of Historical Phonetic Change in terms of Optimality Theory: Great Vowel Shift

A B S T R A C T

The efficiency of optimality theory is being lately manipulated in the field of historical phonological and phonetic changes specifically Great Vowel Shift. The current study tries to review phonological changes of GVS through OT modeling and to find the connection point between adaptation and OT through constraints by the given theoretical studies introduced here as a review. It also sheds the light on accounts about the linguistic principles by which vowel shifts took place and available information about the process of diphthongization. And as a requirement, this paper tackles illustrations to important notions like constraints and correspondence theory.

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DOI: <http://dx.doi.org/10.25130/jtuh.29.4.2022.24>

مراجعة التغير التاريخي الصوتي من خلال النظرية المثلى في تغيرات أصوات العلة

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الخلاصة:

يتم مؤخراً استخدام كفاءة النظرية المثلى في مجال التغييرات الصوتية التاريخية على وجه التحديد (التحولات الصوتية لأصوات العلة). تحاول الدراسة الحالية مراجعة التغييرات الصوتية لتلك GVS التحولات من خلال نمذجة النظرية المثلى وإيجاد نقطة الاتصال بينها وبين التنبؤ الصوتي من خلال القيود الصوتية طبقاً للدراسات النظرية المقدمة هنا كمراجعة. كما يسلط الضوء على تفسيرات حول مبادئ الأزواج في أصوات العلة اللغوية التي حدثت بها تحولات تلك الأصوات من خلال المعلومات المتاحة حول سير تلك العملية ، وكشرط ، يتناول البحث الرسوم التوضيحية لمفاهيم مهمة مثل القيود الصوتية ونظرية المطابقة.

List of Abbreviations

OT	Optimality Theory
◊	Spelling representation
>	The output of a phonetic or phonological process
GVS	Great Vowel Shift
OE	Old English
OF	Old French
ME	Middle English
MdnE	Modern English
PDE	Present-Day English
F.	French

1. Introduction

According to earlier studies by Gess (1996 on Latin to Old French) and Holt 1997, on Latin to Hispano-Romance), history of these languages is manifested as being composed of a series of stages. Each stage exhibits a specific constraint hierarchy. Slight reranking of the constraint hierarchies interacts with variation in relative importance of constraints from language to another and from one time period to another. Such a reranking captures authors' views in several fields of linguistics specifically in syllable structure and phonological or phonetic forms. It is, of course, suggested that several steps, in the historical development of a certain linguistic phenomena, are argued to be interpreted as a result of perception effects and reinterpretation by the hearer leading to the restructuring of the lexicon (Holt, 2003:3). Phonetically speaking, most of sounds changes were brought about via three main processes through history of English. The first is splits which refer to allophones of a single phoneme become two distinct phonemes. Secondly, the merger by which a phonemic distinction is lost like the case of /hw/ and /m/ and the third is represented by shifts whereby sounds redistributed (J. Smith, 2007: 53)

On the other hand, some authors believe that reranking of constraints is not adequate as an illustration for change. Presumably is rather considered as a result not a cause for change. That is, the output of one generations' register-dependent and cue-preservation constraint ranking is stored as lexical forms over which new phonological generalization will hold. This will apparently suggest that the resultant generalization is being applicable to relative forms or some parts of them (Holt, 2003: 22).

Furthermore, a model of GVS in OT is proposed by Miglio and Moren (2003). It consists of three stages. In the first, they initiate constraint ranking like that of vowel length was non-distinctive. All vowels surfaced as long when they were in open monosyllables and the monosyllables are being closed by single consonants. The non-high vowels are surfaced as long in open stressed penults.

The second stage pinpoints that the ranking of constraints is as: the long lax mid-vowels become disfavored and the remaining vowels are either raised or diphthongized. And the third includes the re-structuring of the lexicon by next generation of speakers and to provide correspondence between input and output. Moreover, the above model assumption's also proclaim that the pre-GVS quantity adjustment have made vowel length predictable (Kazmierski, 2013: 71). One important advantage for OT in dealing with a linguistic change is that ranking, of constraints develops and takes the shape of formulating successive constraint rankings and together would present motivations for change from one ranking to another (ibid:93_94).

OT Community (i.e. phonologists and authors who are indulged in such a theory) conclude that it is the strongest model in prosody to providing the efficiency, of enlightening modeling in interaction of competing, motivations and to the integration of typological evidence into phonology (Kemenade and Los, 2006. 3). Needless to say, that language universals are considered as important basis for hypothesizing about earlier pronunciations. Exercising caution appropriately, the commonly observed "Cross linguistic patterns of inclusion or exclusion of particular sounds and sounds combinations can be applied to historical linguistic reconstruction. This particularly seems rather helpful in trying to reconstruct the direction and intermediate stages of sound change (Minkova, 2014:21-22).

2. Adaptation

Adaptation is a term used to designate the assimilation to which a word from a foreign language is subjected to make it fit into system of receiving language. The term may refer to the adapted word itself (Schultz,2012: 491). Some borrowings are being anglicized to be embodied within English dictionaries entries like the word 'physiotherapy' which reflects the French word 'physiothérapie'. In addition to adaptation, an orthographic assimilation is also conducted which leads to the phonological integration that submits to phonological rules and constraints of English (ibid: 50).

As it is phonologically implemented, adaptation is the modification or replacement (i.e repair) of L2 sound or structure to comply or convene more in L1 phonological constraints. It is also recommended that adaptation should be geared to ensure that L1 system remains intact and unchanged (Goldsmith and.e-tal, 2011:763).

J. Smith (2007:18) initiates two kinds of adaptation which are rephrased in a word called hypo-hyperadaptation. This process takes place when listeners reproduce the sound in the target language in either elaborating (i.e. overarticulate (hypo-adopt)) or underarticulating (hyper-adopt) under the controls of communicative and situational constraints. Accordingly, speakers have the freedom to vary their utterance or a repertoire of variant realizations for a given item from which they can choose. However, within those repertoires, Speakers will have prototypical conventions by which they produce specific phonemes or clusters (bid:19). As an example of hypo-hyperadaptation, it occurs when two speakers with distinct systems encounter each other and one of them tries to change his accent to cope with other's prototypical norms. This often happens when speakers who used to drop [h], they pronounce it clearly when they talk with R. P. dialect (ibid:21).

Generally, adaptations are clearly based on between-language grapheme-to-phoneme correspondence rules which are often resembling or undistinguishable from phonologically-based adaptations (Vendelin and Peperkam, 2005:997). Another model is suggested within the scope of adaptation represented by acoustic approximation model. According to this model adaptations are based on the phonetic approximation Similarity. Furthermore, a host speaker who is

encountering a foreign segment, he/she matches this phonetic signal with a native segment which is most closely related (Calabrese and Wetzels, 2009:69). Peperkamp (2004: 341-342) emphasizes that all loanwords Adaptations are phonetically minimal transformations that apply during speech perception.

On the other hand, Lin (2003:1) pinpoints that there should be perceptual approach conducts through the adaptation and processing of sound based loanwords. The perceptual approach firstly, asserts that an adaptation result from misperception is processed at the phonetic level. Secondly, loanwords adaptations originate in perceptual assimilation that maps the non-native sounds and structures at the perceptual level onto the phonetically closest native ones. Providing Cognitive perspectives for discussions, the phonologists' interest in loanwords adaptations has been evolved since the appearance of constraints-based theories. This so, because the patterns of sounds changes in loanwords manifest abundant positive evidence for the phonological constraints that a language, impose on output. What is striking about that, there are often few pertinent items on which generalizations are based (Goldsmith and et al., 2011: 751-752).

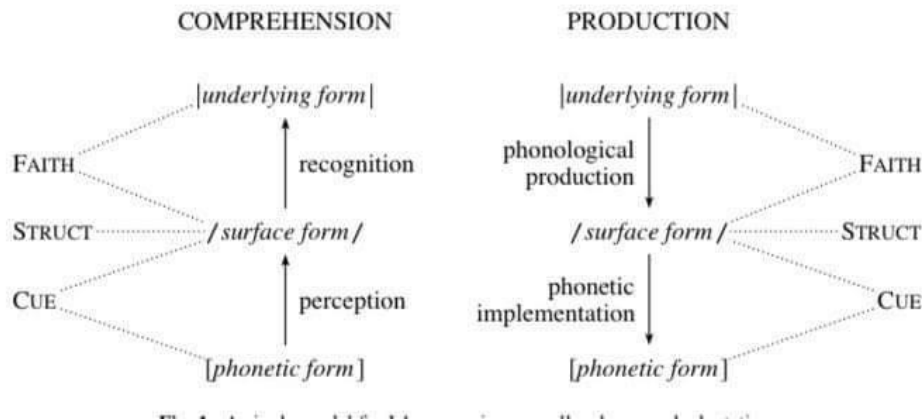


Figure (1).

Boersma and Hamman (2009: 1) on their part, introduce a slightly convincing model which illustrates that loanwords adaptations can be carried out in terms of phonological and phonetic comprehension and production in the first language. This model can be referred in the figure above.

According to the above relations, phonological production is tackled in terms of interaction between structural and faithfulness constraints. While perception described in favor of interaction between structural and cue constraints. The remaining two processes, word recognition and phonetic implementation are analyzed according to one set of constraints each (faithfulness and cue constraints).

3. Constraints

In Theorists' perspective, the closest applicable definition of constraint is the exercise of force to determine or confine action, coercion or compulsion. The terms rule and constraint have been developed into terms of art in linguistics. The ordinary meanings of these words can be only interpreted to have an approximate correspondence to their linguistic utility. Although the two words are closely related in sense, a constraint can be considered as a limit to that rule use. In other words, the exact nature of a constraint depends upon whether one is constraining a rule derivation or a representation (Goldsmith and et al, 2011:4). On the relation between representation and constraint, William (1975:305) assures that there are three main points which reveal the significance of phonetic representation. Firstly, phonemes could have a psychological existence that speakers realize that the word (keep) and (cool) both begin with sound [k]. Whereas speakers of other language will have different classes for this phoneme according to what their phonology organizes it. Secondly, the overall pattering of sounds of a language can be best perceived if phonemes are investigated rather than individual phonetic segments.

And thirdly, it appeals to rather economical consideration that sounds are phonemically represented than individual phonetic segments. On the other hand, the role of phonological rule is represented by the generalizations about a phonological structure. They are usually taken to represent specific derivational instructions and steps related to Surface representation (Goldsmith, 1996: 609). As far as constraints are concerned with conveys and representations, the following assumptions about phonetic representations seem rather uncontroversial (Mahanan, 1986:156):

1. Phonetic representations can be interpreted on the basis of universally applicable conventions (i.e the instructions they contain belong to the implementation of an independent physiological module).

2. Phonetic representations include strings of phonetic segments in a specific nature.
3. Each segment in a phonetic representation is formalized by a set of feature specifications along a scale. On the other hand, phonological representations contain segments which are specified in favour of binary features (ibid:157).

The terms phonotactics and constraints are somehow related to some point as the former has crucial impact on historical phonology of English in being generative (Honeybone, 2019:25). As an example of phonotactic distribution and according to the countertonic which is known as the special stress pattern balancing the main stress, when words were borrowed from French, they were gradually subject to the imposition of two things: (a) the phonotactic distribution system of English and (b) to the language-specific markedness constraints which govern phonotactics itself. In this instance, however some French words contain secondary stress before primary one, psycholinguistically speaking, natives of English, impose their constraints as in (nāture) vs. (nǎture) (Horbin and Smith, 2002:53).

In the reanalysis of adaptations as being more concerned with psycholinguistic and perceptual concepts, adaptations of French borrowings created such a kind of typological input which made important phonological changes or realizations in the sound system of English. It is fairly assured that the word (price) of Anglo- Norman (price), (priese) and (sign) > (seign) had vowels that were identified with a native diphthong of the word (mice) Hypothetically, it may come in mind that the shift process was clearly carried out in such a generalization which is made in favour of closeness in phonetic or phonological representation (Minkova, 2014: 253).

Speaking of the features of constraints, they are either of markedness or faithfulness. They are violable and run into circle of conflict statements about output representation and about mapping between correspondence representations at different levels. But later, analysts impose that the discussion of input should be arranged in terms of language specific hierarchies. Constraints must then submit or be grounded either typologically or functionally. Those of typological grounding feature show dominance. (ie direct effect) rather than a residual effect related to some language-specific phenomena (Hannah and Bosch, 2018:39).

4. Optimality Theory

In the original version of OT and as a model for linguistic analysis, it is stated that its essence falls in the role of suggesting that linguistic generalizations should be described in terms of constraints which are ranked and based on their importance. Constraints are considerably universal elements, but their ranking is language-specific. They are violable and can be mirrored through facets: faithfulness constraints and markedness constraints. The former is to ensure that output representation (surface) is similar to input representation (underlying). And the latter facet requires the output as being the same as the input. The basics of OT are not only bound to constraints, but rather to two main factors represented by generator and evaluator. The generator is able to generate an infinite number of outputs and evaluator functions to select the most appropriate and harmonious candidate that violates the least ranked constraints (Kessar and Mahadin 2020: 173). OT functions to base phonological modification on the interaction of universal constraints that are considered to have communicative motivations (Donegan and Stampe, 2009: 5).

The rise of OT has led to a revival of interest in naturalness and markedness that are respectively arguable with this field. It is observed that markedness can be expressed in OT in terms of number of violations mark for given markedness constraints. Similarly, naturalness can be characterized in OT in favor of a configuration which is possible to be generated via universal constraints set. CON, a configuration that is produced by a relatively high percentage of permutations of CON or a configuration that is favoured by a single constraint or a small set of interacting constraints (Goldsmith and etal, 2011: 745).

According to Prince and Smolensky (1993,2004), OT postulates that there are no rules which govern synchronic alternation in language production. The mechanisms of phonological alternations in OT, is a set of violable and universal constraints that are correlated or interrelated in some sense of ranking (cited in Griffin, 2009:5). All constraints in traditional OT are universal and violable which means that every language has similar set of constraints. Constraints are then defined by two kinds of main categories markedness constraints which prefer more stable and less marked form and faithfulness constraints that establish correspondence between the input and the output assigning a violation for each minimal difference between the two (ibid:6).

5. Correspondence Theory

Correspondence theory is considered as the standard theory of faithfulness within the OT (Oostendrop, 2004:22). According to the crucial innovation of correspondence theory is that input- output pairs no longer have to be identical. That is, the segment in the input is going to be completely distinct from that of the output. The main interpretation for this case is that the input representation is a purely cognitive object whereas the output is a phonetic object (ibid: 23).

However, McCarthy and Prince (1995,1999) point out that the reconceptualization of identity for the relative correspondence in faithfulness between the input and output (De Lacy, 2007:12). Moreover, correspondence theory is the most direct way to ensure the identical relation between two segments in terms of the output forms (ibid: 475). As it so has been manipulated within the frame of OT, the correspondence approach assumes familiarity that formalizes the relation between phonemes that interact in long distance agreement in terms of correspondence. In accord with the given definition of correspondence theory, two structures or units are in correspondence if a relation is established between their component elements. Following OT, correspondence constraints determine faithfulness of mapping between related structures via requiring the identity of their structures. So, this assertion is surely applicable to what happens inside the field of phonology (cited in Rose and Walker, 2001:12).

6. Great Vowel Shift

The Great Vowel Shift that took place between circa 1400 and 1750 made such a kind of inconsistencies between spelling and pronunciation. Throughout such a process, long vowels were raised with exception of high vowels whose position shifting would have been redundant and they were diphthongized (Kruitbosch,2018:10). In other words GVS was the main linguistic rearrangement which happened in English in a century or two during and after Chaucer's lifetime. Thus, it is thought to be the crucial process by which the shift from ME to MdnE took place. Consequently such a crucial event contributed to raise (and in one case fronting) ME long vowels, and diphthongizing high long vowels as the mid long vowels became high long (Lee, 2005:113_12).

Hence, GVS was the main reason of many common changes in English vowel system. Both [e:] represented by <ie> and [ɛ:] by <ea> changed to [i:] in

most words. The vowel [u:] presented by <ou> was undoubtedly modified to [aʊ]. As a result of such a shift, the diagraph <ie> can also represent vowels like [i:], [e], [ɪ], [aɪ], [aɪə], [ɪə], [iə] and [i] depending on various phonetic environments. Whereas <ea> stands for vowels like [i:], [e], [iə], [eə], [ɜ:] and [a:]. According to PDE, the diagraph <ou> refers to [aʊ], [u:], [ʌ], [əʊ], [ɔ:], [ɜ:], [aʊə] and in some contexts to [ə] (Kruitbosch, 2018:28). More reasonable to say, that the GVS occurrence was based on phonological environments. In accord with such satisfactory assertion, there are seven kinds of sounds shifts made by Chaucer, these are:

- [e:] > [i:], [i:] > [aɪ], [ɔ:] > [o:], [ɛ:] > [e:], [a:] > [ɛ:] > [eɪ], [o:] > [u:] and [u:] > [aʊ].

From the analysis of phonological environments made in each shift, they show that, first vowels can be diphthongized when these are shifted in the environment whereby vowels are tense and high. Second, vowels can be shifted into higher vowels in environments of tense and mid equivalents. And third, vowels can be shifted to mid vowels providing the environment of tense and low ones (Xenia, 2015: 45). The stressed Short vowels relatively remained stable throughout the history of English. The most prominent changes concerning short vowels of ME is that of [a] to [æ], [u] to [ʊ], and [ɔ] to [ɒ] preserving the rest like [i], [ɪ] and [e] (Algeo., 2010:147)

As a historically concluded account and in case one may wonder what happened in OE, it is apparently hypothesized that GVS began in OE itself. But it formally occurred in ME formulated via labialization and palatalization of the non-high vowels. Then long vowels inventory is shown as some kind of overall process that involves the desonorization. The desonorization of vowels manifests durational characteristics for their values. Thus, the sonorants like [aa] showed according to dialects, either palatal or labial intrusion whereby became mixed. On the other hand, all other long vowels mixed for palatality or labiality with sonority increasing of the former over the last. It also involves some kind of sonority constraint which made up the production and perception of a long vowel. This kind of shift is considered as precursor of MdnE vowel shift. According to the proposition above, raising and shifting of ME was subject to sonority constraint, this can be shown in the following figure the (Jones, 1989: 140-141):

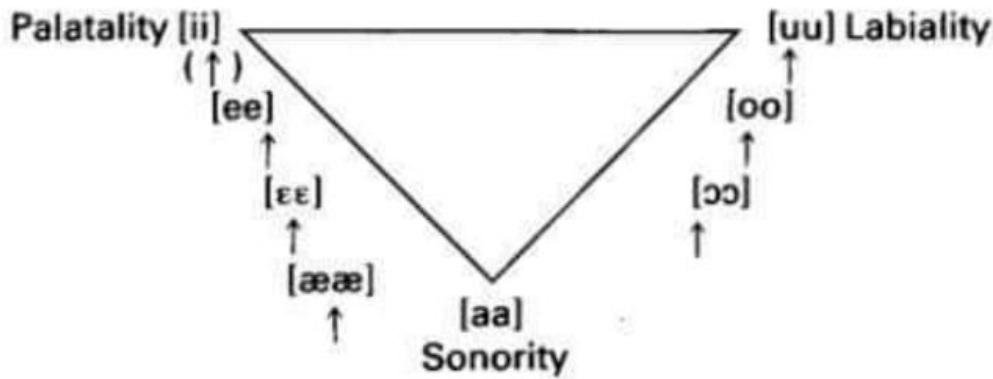


Figure (2).

7. Optimality Theory and Great Vowel Shift

As it is considered one of the main cores of OT, phonological markedness postulates a set of diagnostics related to the behaviour of sounds in the phonological patterning like: neutralization, epenthesis, assimilation, coalescence and deletion. The natural markedness is the essential cover term or equivalent for all other interpretations of markedness which includes implications for language acquisition, typological frequencies of form occurrence, ease of articulation, perceptual salience and diachronic stability.

Phonetically speaking, markedness of front rounded vowels for example, is grounded in acoustics. Lip rounding has an effect of lowering all formants and since front vowels are characterized by high values of the second formant, lowering the lip obscures the value of the second format. The resultant could be outranked in faithfulness (Kazmierski, 2015: 133 – 134).

Minkova (2014:51) proposes that there is a controversial perspective between phonetic processes and optimization which can be introduced in the following statement:

“Changes affecting the contrastive and relational status of sounds: replacements, additions, deletions of segments, phonemic merger and splits, and the positioning of a segment on Strength scale, are closely linked to the physical correlates of sounds: their articulatory, acoustic and auditory properties. The phonetic

Grounding of sound change is universal, though the individual paths of Optimization in production and perception of sounds are language-Specific. One of the main mechanisms driving phonological changes, therefore, is the diachronic selection of optimal realizations, where the demands on production and perception are in constant conflict.”

As it is seen appropriate to say, entities which undergo sound change of lineages, are of successive mental representations of sounds. These can be implemented as neural patterns in the brains of speakers. For instance, the one accounted to the successive pronunciations of stressed vowel in word of PDE (make) as [a>a> a:> æ:> ε:<e: >eɪ] (Kazmierski, 2015: 96).

The instability and markedness of long lax mid vowels are typologically unknown as pointed out by Miglio (1999). It is also asserted by theorists that all ME words containing a long lax mid front vowel had a variant containing an ME long tense mid front vowel. This variation led to the instability of OE [æ:] and ME [3:] (Holt, 2003:193). The developments of quantity system which mirrored on surface OE vowels were quite predictable from the phonological context that is pointed out in ME before GVS. Therefore, in open monosyllables closed by single non-geminate consonant vowels can be: [i:], [u:], [e:], [ε:], [o:], [ɔ:] and [a:], in closed medial syllables and final syllables closed by a geminate or cluster the vowels [i], [ε] [u] , and [a] are more predictable and open stressed penults would rather contain [i], [e:], [ε:], [u], [a:] and [ɔ:] (ibid: 202).

Modeling by OT, though it seems a bit circular, it uses constraints ranking to determine the course of change concerned with chain shifting. Then, the winning ranking is surely considered the one that is supposed to give the expected output (Stenbrenden, 2016: 3). Moreover, the chain shifting which had been manipulated through GVS was, controversial and problematic under conditions of OT (Fulcrand, 2015:53). Chain shift can be described as more sophisticated phonological process that involves a series of interlinked changes. A General representation of chain shift can be illustrated in the following figure:

/A/ →/B/ → /B/ >/B/ > /C/ →/D/

First /A/ moves to the phonetic position of /B/ and becomes /B/. Then during the second stage, under systemic pressure which preserve contrast, /B/ moves to the phonetic position of /C/ and becomes /C/. Finally and still under the systemic pressure, /C/ is modified to /D/. From the proposition of this model, output of one stage and the input of the next one are of a different nature. Based on the representation of chain shaft, the vocalic developments of the following vowels are to be considered (ibid: 534-535).

- /a:/ → [ε :] > [ε :] → [e:] → [i:] > [i:] → [ai]
- /ɔ: / → [o:] > [o:] → [u:] > [u:] → [au]

After the manifestation of chain shifts introduced so far, reconstructing vowel quality is a notorious task specially dealing with lack of orthographic standardization and the dialectal variation of the period in which changes and shifts of vowels took place. Thus most author's set out their accounts on the linguistic changes, especially what is called (Great vowel Shift) on the major and reasonable generalizations found in literature. The stages of language change developments dealing with historical changes can be applicable to GVS. These stages can be arranged in three levels. First, it is an inert stage that depicts a specific ranking of universal constraints. The second is where at least one constraint is previously ranked and finally, where (i.e. within the linguistic form) next generation of speakers reanalyzes the output they hear to fulfill more harmonic relation with the input (Holt, 2003:191-192). In addition, prosodic and environmental factors should be also put into considerations as well as the quantitative and qualitative measures; This can be shown in the following example on the three Stages (ibid. 203-204):

- /te:d/ > /ti:d/ > /taid/ (tide)

8. Diphthongization

From a historical point of view, the sources of late ME diphthongs can be pointed out as results of either direct borrowings from Old Norse, Anglo-Norman or French or processes of vocalizations or epenthesis in sequences of a vowel + [j,-w,-h] as in the followings (Minkova, 2014:263):

- [ej] : ON megen, (main), ON þeir (their)
- [ow]: ON þōh (though)

-[ej] : (Old French deis (dais) , delei, (delay)

The outputs of diphthongization shifts whether in ME or from ME to MdnE, are bound to the interplay of four factors:

1. Diphthong optimization in perceptual terms, which is illustrated by the progressive longer trajectory as in [ij]> [ai] and [uw]> [au].
- 2- Diphthong optimization in articulatory term: which means the minimization of effort under conditions of gesture number (i.e economy of time and muscle energy).
3. Optimal spacing of adjacent entities-merger: changes resulting in merger are also attributed to optimal spacing of vowel entities like the phonemic distinctions that are based on small acoustic and articulatory differences which are hard to maintain.
4. Optimal spacing of adjacent entities -merger avoidance: merger avoidance is the principle which holds maintenance of contrast between historically different entities (ibid: 266).

Krug (2003: 111) assumes that the recent advances in natural phonology and OT lexical diffusion theories are sufficient evidence that high- vowel diphthongization can be motivated phonetically and could be considered as a natural change based on hierarchy of sonority for vowel features.

Wanner (1976:186-187), on the other hand, notices that diphthongs can be described in terms of their connection with sociolinguistic embedding (i.e. variation, variable conditioning for the apparent time evolution within the various dimensions of one speech community). One more point expressed significantly is that, through diphthongization processes of vowels, they are being locked into frame work subject to chain shifts that involve both monophthongs and diphthongs. It is manipulated through peripheral vowel (i.e. tenses that involves extreme vocalic articulation) in relation to the other counterpart represented by lax but recycles in the same value as in the case of /e:/ > /i:/ > /aI/. In this respect, Stenbrenden (2016:138) explains diphthongization of /i:/ with' the approximation to nearly similar value for it. That is, ME, as it is reported from the various resources, started to diphthongize in the second half of the fifteenth century and

transmitted to [əi] around 1500. It is believed that the first stage of diphthongization took place earlier to the time dated in c. 1400. The maximization of diphthong whereby the articulatory distance between onset and offset positions became longer resulted in [əi] which changed to [ʌi] in the seventieth century and finally into [ai] in the eighteenth century.

For Donegan (1993), diphthongization is a natural process which enhances the characteristics of a vowel that is given a free space or reins in stressed-timed languages, because of longer duration spent in the pronunciation of stressed vowel. This view will then implicate that diphthongization of the stress timing early MdnE high vowels stated the shift. It is suggested that a phonologically-based scenario where stress is focused on the initial position of a vowel causes its raising. As the initial portion becomes smaller and smaller, the whole vowel takes on the value of the reduced second half like:

[e:] > [ei] > [i:] and [o:] > [ou] > [u:] (cited in Kazmierski, 2015: 60-61)

By the initiation of qualitative features and particularly phonetic and phonological environments, it is assumed that diphthongization process was carried out thusly. It is noticed that the consonantal segments like [ʃ] , [T] and [x]with which the stressed vowels space was split into two sections or halves. The first half is an input of a front vowel [æ] ,[i], [e] or and the second is a vocalic element reflecting backness or labial colour which is triggered by a consonant effect. This might be applicable to the examples below:

-[ɛ]	[ɛɪ]	[ɛɪ]
-ehte	<ey3t>	<eyte>
-ehhte	<eighthe>	
-<eht>	<ey3the>	
	<eizte>	

Practically the examples above show that in environments of <gh> the diphthong spellings of <ei>, <ey> or <-eigh> presumably make vowel space coloured with some vocalization (Jones, 1989: 142-143).

9. The Hypothesis of Modeling Theories for Historical Change

The current study has dealt with devising possible perspectives of OT in GVS considering it as the crucial historical event for phonological change took place in the history of English. Though it seems rather controversial, OT gained its authority in the field sound change is being the comprehensive principle or the pillar that holds naturalness and distinctive features theory under conditions of markedness and faithfulness constraints relatively imposed by the universality of those constraints and yet narrowing those universals to language-specific measure. The first efficiency of OT may take a rather general role in positioning nature's innateness to the connection with universal constraints preserving the Compatibility and feasibility of these constraints among languages in its broad concept. The second efficient advantage of OT holds approximation and similarities among languages features of sounds under by the basis of be one feature of a specific sound more faithful as a constraint inside the system of a specific language phonology.

Particularly, the proposition represented by Chomsky's, (1957) review of Jacobson and Halle's fundamentals of language, hypothesizes that the sound systems of all languages can be characterized via limited number of universal distinctive features. Those features can assign two segments to the same phoneme if they have similar feature specifications (cited Ghafil and Habeeb, 2014: 14).

Previously Chomsky and Halle (1968:4) proposed the natural hypothesis which introduces language system as a set of properties represented by linguistic universals devised by an innate authority. Consequently it led them to suppose that universal phonetics establishes the concept that utterances are sequences of discrete segments. These segments represent complexes of particular set phonetic features. And the simultaneous and sequential combinations of these features submit to a specific set of constraints (ibid:5).

The above illustration may yield the assertion that when the sequential combinations are subject to a specific set of constraints, (i.e. possibly language-specific constraints), it demands the interplay of markedness and faithfulness of

those constraints is to generate the suitable output within a language domain. And this would evolve our third hypothesis that requires the essence of correspondence theory which links familiarities or similarities for both phonetic or phonological surface forms and their features together to maintain convenience of an output related to a specific phoneme or sound. And correspondence theory is the most crucial effective concept proposed within the frame of OT.

In considering OT as a psycholinguistic concept and giving it more cognitive feature as much as constraints concerned, it becomes very clear that there is some sort of homogeneity in the application of adaptation and OT model. In applying any kind of adaptation (i.e hypo-hyper adaptation), it may also require some kind of ranking of constraints on the perceptual level. In other words, adopting a specific sound in English is subject to be given a priority to be compatible and feasible according to English constraints. When the phonetic form undergoes a kind of correspondence filter through surface approximation to underlying form to achieve rational comprehension which is triggered by perception and recognition, the familiarity between comprehended and produced form is being reanalyzed and fulfilled through faithfulness which undoubtedly infers unmarkedness of a specific constraint to the target language. Hypothetically, many borrowed words or pronunciation conventions from French for instance developed into English on the basis of juxtaposition of those perceptual and cognitive factors without breaking English constraints and yet allowable violation for a predictable faithfulness is obviously rearranged in term of correspondence of (1) features of sounds that were to other forms according to their familiarity of those features space or axis and (2) phonetic and phonological environments where they were initiated to change.

Following Chomsky and Halle's proposal through the investigation of phonetic and phonological influence of French on English for instance, could be hypothetically reasonable to some extent. This claim can be justified through the adaptation of conventions themselves (i.e. by which they came to invent or innovate constraints) in English which are approximately generalizations that served to first, create two distinct phonemes for one grapheme or one phoneme for a diagraph which is nearly universal in both languages as in the case of adapting (-ss) to represent /s/ and (c) to be pronounced /k/ in certain phonetic environments. Second, the contact of two languages, English and French in terms of adaptations

for phonetic representation interactions created some sort of phonemic contrasts that invented or added new features which might have been perceived in a particular process and pronounced in a satisfactory way. And third, the phonemic contrasts presumably made a crucial role to distinct lexemes semantically as in the following words:

- price [prais] priese (OF)
- damn (OF) dame [dem] English

Another approach made by Stamp (1969), which is represented by natural phonology theory. It hypothesizes that the phonological system of a language is an innate system of physiologically-induced articulatory process (cited in BJarkman, 1970: 3). This theory significant implications intensify that any speaker of any language is the residue of an innate system of phonological substitution processes. Such processes indicate a complete potential system of phonological restrictions. Such assertions that are concerned with naturalness puts and filter rules in:

1. Underlying form which is the raw material of the receiving language.
2. Natural rules universally interact in terms of compatible constraints.
3. The processes of natural phonetic form with which substitution, merges or assimilations are applied to, result in the output.
4. Process that generate correspondence in output via natural faithfulness.

If it is considered under such conditions, one might possibly suppose that diphthongization of long vowels and the fusion of the French /i/ with some long vowels in terms of feasible universal constraints made a remarkable shift in innovating English vowels articulations. One must hypothesize or nearly admit that such transitions can be based upon the fact that the shift from ME [ĭj] or [ej] to [ei] was based on the compatibility and interaction of universal constraints which govern the two portions of the diphthongs for both [e] and [i].

10. Preliminaries and Discussion

The optimal solutions seem quite fruitful in dealing with the adaptation of the phonetic rules of pronunciation conventions. The intriguing fact about

historical changes, is that they get along with a quite systematic optimization of outputs as being considerably unmarked in terms of faithfulness. Adequately, adaptations of borrowed or loan forms of French in English is the field where considerations must be made about. Although there are unlimited amount of generalizations and phonetic rules were brought by those French conventions, but what matters is how those rules were manipulated and implemented to transmit and shape phonetic and phonological system of English through its historical changing chronology. The absorption of borrowed forms come to be realized according to what extent and measure their constraints are unmarked and faithful under conditions of English pronunciation standards. In taking GVS as an example for optimal shift, mergers, and chains shifts and even reductions were outputs to those shifts took place and changed from OE to ME.

In considering the word shift and diphthongization of the nasalized vowel /ā/ in the word (change) (English change), there must be primary input that holds close features for the diphthong [eɪ] portions like:

/a/ > /a: / > /ei/

Whether there was a front open /æ:/ or not, it makes sense under vowel trajectory that the shifts:

-/a/ > /æ:/ → /a:/ > /ei/

can be more correspondent to English faithful constraints. Even if one may suppose that the nasalized French /a/ is being described as a rounded back, recalls the shift of OE /ā/ to [ō] as this option is rather controversial, it clearly holds making candidates to backness and openness features.

As reported by the repertoire conducted in OE with the word (prēost), (priest), it was recorded in ME scribes as (prest, presth, priest, prist, late ME (preast) and (proest). Such a variety of spelling and by the virtue of pronunciation diversity, contributed to create new vowel realizations or allophones. Supposedly, the possible pronunciations given to the vowel in the forms of the word above can be either [e:], [ε:] or later [i:].

However, the applicability of OT may confront a serious challenge within the scope of historical changes for some reasons. The main logical reason is that history does not repeat itself with the same scenarios by which these changes

took place. Secondly, the perceptual exchange between two participants submitted to a series of hierarchy ranking which is undoubtedly or somehow unpredictable, not to mention the phonetic drifts. Despite what is said, the essence of OT in relation to other theories like natural phonology, most phonological systems of languages must contain at least three quantitatively different vowels like [i,a,o]. When such a perspective of universality is considered, it is rather applicable to suppose that the surviving diphthongs of French origins like [oi] and [ou], may submit to optimal processes.

The current study tries to apply possible concepts of OT to historical changes according to the following procedures:

1. Forms of words are selected on the basis of being borrowed from French to see how much change took place according to the spelling and phonetic information provided.
2. Although universal constraints may manifest some typological inference of correspondence, they can be interrupted by language specific
3. The reranking for the vowels or diphthongs in the selected words submit to features priority on the basis of their spacing.
4. The reanalysis stage is formalized by the PDE final forms of vowels.
5. Providing long vowels of ME in considering that diphthongization took place after lengthening and raising.
6. Word forms in ME are provided to illustrate etymological information.

11. Words Analysis

1- Proud / Praod/

According to the etymology dictionary the word 'proud' has two different forms in both old French and Old Norse: OF, (prud) and Old Norse (prūðr). Most historical analysts infer that the diphthongization of [u:] or [o:] led to the late form [əʊ]. The major familiarities which /aʊ/ is measured on are the vowels /ū/ and /ō/.

In considering that /ū/ and /ō/ are typically compatible under conditions of rounding backness features, it may encounter the

questionable idea of where the portion /a/ comes from. In accord to what chain shifts propose, lengthening happened before diphthongization, it should hold to the assumption that one of the long realizations of /a/ is involved to reach to the reanalytic correspondence of the output /au/ and since /a:/ is involved in backness feature. This can be clarified in the following:

-*/æ:ū/ > /a:u:/ → /au:/ > /au/ . (prūd)

-*/æō/ > / a:o:/ → /ao:/ ---- /au/. (prōd)

That is [æ:] and /a:/ must submit to some sort of shortening as it is dominated by the second portions of /ū/ and /ō/.

2. Silence /saɪləns/

The word originally came to English from OF (Silence) and being adopted into ME as (Cylence, cilence or scilence). More likely that the reranking of /i:/ with /y/ of ME is the most earlier part by which the two vowels come to be compatible in terms of features. But it is important to notice that [y] has different realization in various environments. The diphthong /aɪ/ submits to both labiality ranking and the trajectory of lengthening measures in frontal and opening environment:

-/ ε: / > /e:/ > /i:/ > [aɪ]

-*/æe:/ > / æe / > /a:i:/ → /aɪ/

Since the second portion is the dominant one, likely the lengthening of the first is considered as marked and neglected. And whatever the letter <i> is was pronounced in OF or F., such a factorial typology would enhance constraints to overlap faithfully via universal qualitative features like: front, tense and high.

3. Rose /rəʊz/

The word (rose) was borrowed from ON /rōsa/. The case of diphthong in this this word is more applicable to optimal features for both portions of it, /o/ and /u/. And it is easily feasible into English conventions. In case exercising length before diphthongization, it may look like:

-*[o:u.] > [ou:] → [ou] > [əu]

-[ō] > [o:] > [u:] > [ou] → [əʊ]

To differentiate [ou] from [ow], the first portion of [ou] represented by back short /o/ or any of its early realizations like [ō] or [ū] was created in PDE to [ə].

4. Wait /wait/

In ME (wayton) given to the diagraph value <ay> and probably it is originated from OF. (waitier). Since both portions of the diphthong share the possible optimal features in frontness and opening, the reanalysis would be more predictable without exercising length trajectory as in the following:

-*[a:] > [ɛ:] > [eɪ]

-[a:] > [ɛ:] > [e:] > [eɪ]

The harmonic trajectory combine three long vowels in one feature represented by frontness for each of [ɛ:] [e:] and [a:].

5. joy /dʒɔɪ/

ME form is represented by (joye) which is originally borrowed from French. Historically Speaking, the introduction of the diagraph (oi) to ME was part of literacy representation from borrowed words. At some point, when ME was not the using the letter /i/ it came to be adopted alongside with pronunciation of the word poynt (point). It may seem violable and marked under the demands of OT but rather faithful to the rule of (poynt). In case of approximation or ranking French with English, modern French words like royal, bois, bait and voie contain the same diagraph which is usually pronounced with /wa/ and considered as an open syllable in French like:

/vwa/ voie

/bwa/ bois

As the two features of a French pronunciation represented by open syllable and the articulation of /w/ with /a/ are less faithful to 'poynt' constraints, hypothetically assimilated into /oy/ and later to /oi/. The reanalysis chose for optimal typology to English was the cursor assimilation of /w/ to [o] and /a/ and to /i/.

12. Conclusions

Historical linguistic changes concerned with area of phonetics and phonology, is the area of significant inputs which PDE speakers utilize nowadays. Theoretically speaking, OT has been the most effective approach throughout dealing with phonological or phonetic changes. Obviously, it is the theory that is motivated by its connections to two important theories represented by natural phonology and distinctive feature these in favour of universal constraints. It operates on giving these constraints a reranking that holds priority for language-specific areas in dealing with phonological change phenomena in terms of faithfulness of the constraints themselves. The relation between adaptation and OT is devised via perceptual factors for an underlying form that through a adaptation, speakers may device their cognitive strategies to reach the correspondence between input and output according to their perception and stored scenarios for constraints in their phonological system the (ie correspondence is achieved by giving their language - specific constraints a priority). In this respect, many loanwords, specifically from French and although introduced several spelling and pronunciation conventions, they were absorbed and reranked via optimal processes to cope with English generalizations.

Considering phonetic or phonological presentations and rules as psycholinguistic entities, constraints are the framework under which the two concepts operate. That is, they fall in limits and control of constraints. GVS was the most crucial phonological change that English ever witnessed. Throughout GVS there were conditioned changes represented by raising tense long mid vowels like [e:] > [i:] is depending upon the optimal features the two vowels share and spacing or trajectory. It is presumed and probably a fact that lengthening of vowels took place before diphthongization which is also optimized through trajectory of optimal features though there are exceptions of unconditioned shifts or diphthongizations like the diphthong [oi] which was borrowed through French convention. Lengthening of ME long vowels could be the earlier method by which long vowels were diphthongized.

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